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1982
W16

WATER QUALITY
IN
UXBRIDGE BROOK
AS RELATED TO
SEWAGE EFFLUENT DISCHARGES
FROM
UXBRIDGE SEWAGE TREATMENT PLANT
1978

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TOWNSHIP OF UXBRIDGE

By
Technical Support Section
Central Region
Ministry of the Environment

January 1982

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Dear Sir/Ms:

I have attached for your information a copy of our report entitled "Water Quality in Uxbridge Brook as Related to Sewage Effluent from Uxbridge Sewage Treatment Plant".

Surveys such as this 1978 summer survey of Uxbridge Brook are meant to be a method of checking the quality of the final effluents produced at sewage treatment plants, and the impact of these discharges on the quality of the receiving water body.

The quality of the effluent from the Uxbridge Sewage Treatment Plant has improved over the years. During the 1978 survey, the quality of the effluent was generally good, but did contain high concentrations of free ammonia and nitrite, and high bacteria densities. Except for nitrite and bacteria, the effluent discharge from the Uxbridge Sewage Treatment Plant did not have a major impact on the water quality in Uxbridge Brook.

Please contact this office if you have any questions on the contents of the report.

Yours truly,

W Lammers

W. Lammers, P. Eng.
Chief, Water Resources Assessment
AVC/ns/W-K

Attach.

KWOC

1. Water Quality - Ontario

2. Sewage Effluent

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INTRODUCTION

As part of a continuing program to assess the impact of sewage treatment plant (STP) effluents on the water quality of the receiving water bodies, Uxbridge Brook in the vicinity of the Uxbridge STP outfall was surveyed during the summer of 1978.

The stream section surveyed extended from a point just upstream of the urban community of Uxbridge to as far downstream as the first concession road north of Wagner Lake and east of Leaskdale (Figure 1).

The head waters of Uxbridge Brook originate in the kame moraines and till plains south of Uxbridge, and the stream then flows north through sand and clay plains in the vicinity of Uxbridge and through peat and muck deposits out of the study area. Except for the section through Uxbridge, the land through which the stream flows is swampy. About eight kilometres north of Uxbridge the stream enters Wagner Lake, a natural lake of 35 hectares in area, having a mean depth of 3.5 metres, for an average volume of 1.225×10^6 m^3. Uxbridge Brook leaves Wagner Lake about 9.5 kilometres north of Uxbridge, flows in a general northerly direction, and joins Pefferlaw Brook near Udora.

Apart from urbanization in Uxbridge, most of the lands adjacent to the stream, south of Uxbridge, are used for agricultural purposes. North of Uxbridge, most of the lands are forested with the exception of Wagner Lake, whose shores have been partially developed as a cottage area.

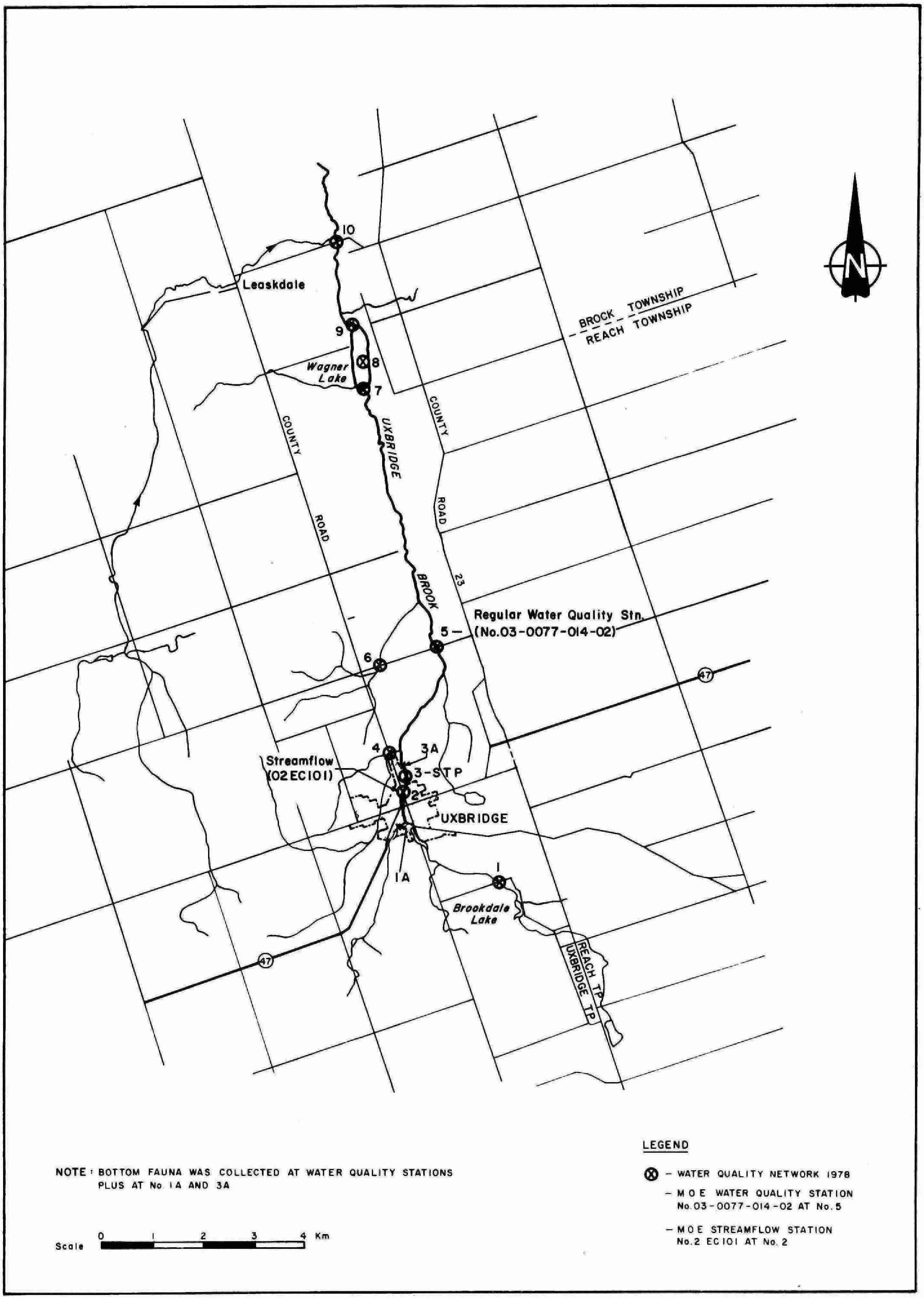
Uxbridge Brook supports two distinct fisheries. Upstream from Uxbridge, there is a cold-water fishery which includes brook trout; downstream from Uxbridge including Wagner Lake, there is a warm-water fishery of pumpkinseed, perch, and bass.

SAMPLING NETWORK AND PARAMETERS

The sampling network for physical, chemical and bacteriological parameters consisted of 10 stations. Six were located on Uxbridge Brook, one at the Uxbridge STP outfall, and one on each of two tributaries. In addition to these, Station #8 was located in the deepest part of Wagner Lake. It was sampled at three depths, 8 T at the top, 8 M at mid-depth and 8 B at the bottom.

During the period from May 18 to August 24, 1978, eight sampling runs (bi-weekly) were conducted at all stations except stations #7, #8, and #9. Four sets of samples were collected at Station #8, three at Station #7 and two at Station #9. Two of the runs, June 16 and August 4, 1978 were carried out at night to determine the possible impact of plant respiration on the dissolved oxygen concentrations in the stream. The data for both night runs were incorporated in the overall assessment of stream quality. The night sampling was carried out between 1:00 a.m. and 6:00 a.m.

The parameters measured in the field or analysed for at the Ministry's laboratory were:



NOTE: BOTTOM FAUNA WAS COLLECTED AT WATER QUALITY STATIONS PLUS AT No. 1A AND 3A

LEGEND

⊗ – WATER QUALITY NETWORK 1978

– M O E WATER QUALITY STATION No. 03-0077-014-02 AT No. 5

– M O E STREAMFLOW STATION No. 2 EC101 AT No. 2

Figure 1 :Water Quality Sampling Network, Uxbridge Brook, 1978

Physical

- Temperature
- Total solids
- Suspended solids
- Conductivity
- pH

Chemical

- Dissolved oxygen
- Five-day biochemical oxygen demand
- Total phosphorus as P
- Soluble reactive phosphorus as P
- Ammonia nitrogen as N
- Total Kjeldahl nitrogen as N
- Nitrite nitrogen as N
- Nitrate nitrogen as N

Bacteriological

- Total coliform
- Fecal coliform
- Fecal streptococcus

In addition to the foregoing, qualitative bottom fauna sampling was conducted at 11 locations, nine of which corresponded to those of the water quality monitoring network (Figure 1). This sampling was carried out during the week of June 26, 1978.

In subsequent sections, the sample results for Wagner Lake will be discussed separately; but the top sampling point (Station #8T) has been considered part of the Uxbridge Brook flow system for the sake of continuity and because the top water layers are used extensively for recreation.

STREAMFLOW

Streamflow data is available for Uxbridge Brook at Station #02EC101 (equivalent to Station #2 of the water quality monitoring network). It is situated upstream of the Uxbridge STP outfall. Records of daily flow for this station extend back to November 1970.

The records indicate that flows are surprisingly uniform from year to year, season to season, and from month to month (Table 1). The lowest daily average flow on record is 130 L/sec (4.6 cfs) on June 19, 1971. In general, the annual minimum daily average flow was rarely less than 170 L/sec (6 cfs) and could occur in any month, e.g. 263 L/sec (9.3 cfs) occurred on April 26, 1974 when streamflows in Southern Ontario are normally at their peak.

The hydrograph of daily average flows for 1977 is presented as an example of the flow distribution in Uxbridge Brook (Figure 2). The average flow for 1977 is the lowest on record for the eight years this station has been in operation. As can be seen, the average daily flow was generally in the 198-340 L/sec (7-12 cfs) range.

Without a more detailed study of the flows, it might be concluded that the dam and reservoir in Uxbridge upstream of Station #02EC101 (Station #2) was responsible for the lack of flow fluctutation at this gauging site. This dam and reservoir are owned and operated by the Town of Uxbridge. The reservoir is used primarily for recreational purposes and is periodically stocked with brown trout. The water level is controlled by stop logs which are taken out and replaced randomly. This operation is weather dependant.

TABLE 1 - SUMMARY OF FLOWS IN UXBRIDGE BROOK AT UXBRIDGE, STATION #02EC101

MONTHLY AND ANNUAL MEAN FLOWS IN CUBIC FEET PER SECOND* FOR PERIOD OF RECORD

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	MEAN
1970	--	--	--	--	--	--	--	--	--	--	11.9	10.9	--
1971	10.5	11.5	11.1	15.8	11.4	12.0	11.7	11.2	10.1	10.1	10.6	11.7	11.5
1972	10.3	10.2	11.0	23.2	13.6	11.2	10.3	12.0	12.8	13.9	14.4	13.3	13.0
1973	12.5	11.5	18.1	13.1	11.9	13.9	12.0	10.3	10.9	13.6	14.2	12.3	12.9
1974	12.8	12.5	16.1	16.1	15.5	12.0	13.2	11.3	11.6	12.1	12.6	12.1	13.2
1975	11.6	16.5	16.5	15.9	13.9	10.1	9.8	10.2	11.2	10.9	10.3	10.1	12.2
1976	10.3	12.8	20.2	15.9	14.4	11.7	16.2	12.4	11.3	10.6	11.2	11.6	13.2
1977	10.6	9.9	14.6	11.5	9.5	9.3	8.4	10.7	10.6	10.6	10.7	10.9	10.6
1978	10.3	9.8	11.1	17.1	15.0	11.0	9.2	12.1	12.2	13.1	11.8	10.9	12.0
Mean	11.1	11.8	14.8	16.1	13.2	11.4	11.5	11.3	11.3	11.9	12.0	11.6	12.3

Annual Extremes Of Flows In cfs And Annual Total Flows In ac-ft** For Period Of Record

YEAR	MAXIMUM INSTANTANEOUS FLOW	MAXIMUM DAILY FLOW	MINIMUM DAILY FLOW	TOTAL FLOW
1970	--	--	--	--
1971	160.0 cfs at 2200 EST on June 27	32.0 cfs on June 28	4.6 cfs on June 19	8290 ac-ft
1972	94.0 cfs at 1834 EST on Apr. 13	70.0 cfs on Apr. 14	8.4 cfs on July 29	9450 ac-ft
1973	135.0 cfs at 1840 EST on Mar. 4	88.4 cfs on Mar. 4	7.8 cfs on Feb. 14	9320 ac-ft
1974	120.0 cfs at 0445 EST on Mar. 5	100.0 cfs on Mar. 5	9.3 cfs on Apr. 26	9530 ac-ft
1975	180.0 cfs at 1726 EST on Mar. 19	85.0 cfs on Feb. 25	6.2 cfs on July 12	8850 ac-ft
1976	135.0 cfs at 0202 EST on Mar. 21	80.0 cfs on Mar. 21	6.9 cfs on June 9	9610 ac-ft
1977	54.0 cfs at 0530 EST on Mar. 10	44.8 cfs on Mar. 10	6.7 cfs on July 23	7690 ac-ft
1978	44.0 cfs at 1648 EST on May 12	40.2 cfs on May 14	4.7 cfs on July 18	8680 ac-ft

Location - Lat. 44 06 45N
Long. 79 07 20W

Drainage Area - 24.3 km² (9.4 mi²)
Regulated

* cfs x 0.0283 = m³/sec.
** ac-ft x 1.233.5 = m³

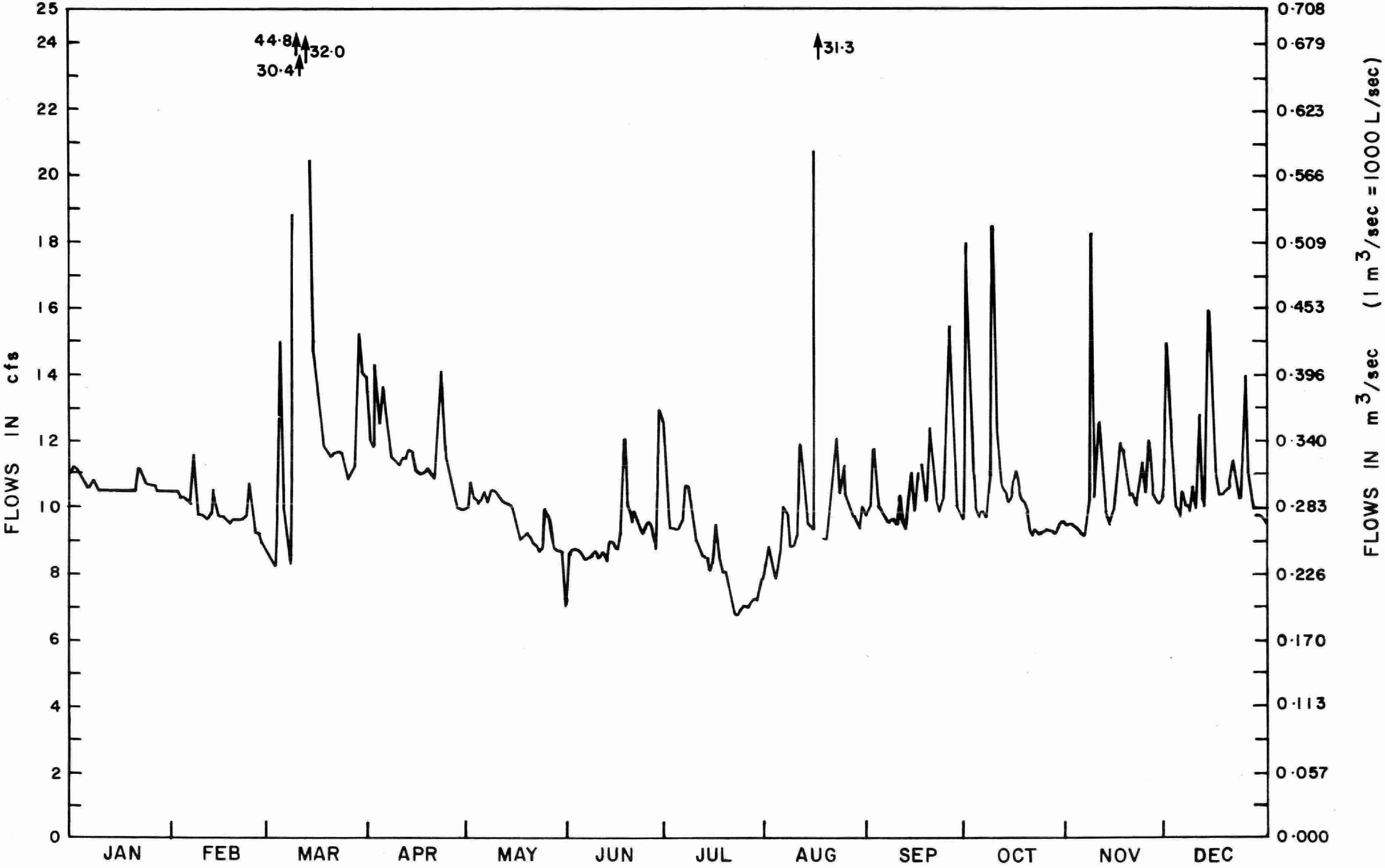


Figure 2 : Hydrograph of Daily Average Flows for Uxbridge Brook at Uxbridge, Station # 02EC101; Year : 1977; Drainage Area : 24.3 km^2; Location : Lat : 44 06 45 N, Long : 79 07 20 W

During the water quality sampling runs, instantaneous flow readings were taken from the chart at Station #02EC101 concurrent with sampling at Station #2 on five occasions. These flows ranged from 190 L/sec (6.7 cfs) on July 27 to 308 L/sec (10.9 cfs) on August 4, 1978. These flows were slightly below the normal range for this time of year based on monthly averages (Table 1). According to the records for this station, the minimum daily average flow for the duration of the 1978 sampling program, May 18 - August 24 was 133 L/sec (4.7 cfs) on July 18, 1978 and the maximum was 470 L/sec (16.6 cfs) on May 21, 1978 (Appendix 1).

The frequency analysis of annual minimum flows at Station 02EC101, averaged over seven consecutive days, indicated that the flow in Uxbridge Brook during extreme droughts would be well sustained. The annual minimum flow average over seven consecutive days for a return period of 20 years (7Q20) was estimated to be 147 L/sec (5.2 cfs - Figure 3) as compared to an annual mean of 348 L/sec (12.3 cfs - Table 1).

UXBRIDGE SEWAGE TREATMENT PLANT

The Uxbridge STP is owned and operated by the Regional Municipality of Durham. The design capacity is 3640 m^3/day (0.8 MIGD). The type of treatment provided is tertiary - an extended aeration process with polishing filters and phosphorus removal. This plant came on line in December, 1977. During the eight sampling runs, the daily average flows ranged from 1120 m^3/day or 13L/sec (0.247 MIGD) on July 27 to 1860 m^3/day or 22L/sec (0.410 MIGD) on June 16. The average flow for 1978 was 2150 m^3/day or 25L/sec (0.473 MIGD).

The quality of the effluent from the Uxbridge STP was unacceptable due to high bacteria counts and high concentrations of nitrogen. Although the final effluent at this plant was disinfected, bacteriological analysis of the final effluent indicated geometric mean densities of 21500/100 mls. for total coliform, 613/100 mls. for fecal coliform and 593/100 mls. for fecal streptococcus. These densities would indicate ineffective disinfection.

The average ammonia concentration in the final effluent at 8.2 mg/L and nitrite nitrogen at 1.08 mg/L were high. These concentrations indicate either inadequate nitrification in the treatment process or some substance in the raw effluent that was hampering the effectiveness of the nitrifying bacteria. The expected ammonia and nitrite concentrations for this type of treatment process would be in the order of 2-3 mg/L and 0.1 mg/L respectively.

The final effluent analysis for 1978 on file in our Municipal and Private Abatement Section, differed from that found during the survey. The effluent quality found during the survey was better than the 1978 annual averages as shown in the following:

Parameter	Survey	1978 Average
BOD_5	8.3 mg/L	8.8 mg/L
Tot. P.	0.147 mg/L	0.487 mg/L
TKN	9.5 mg/L	11.3 mg/L
SS	3.4 mg/L	12 mg/L

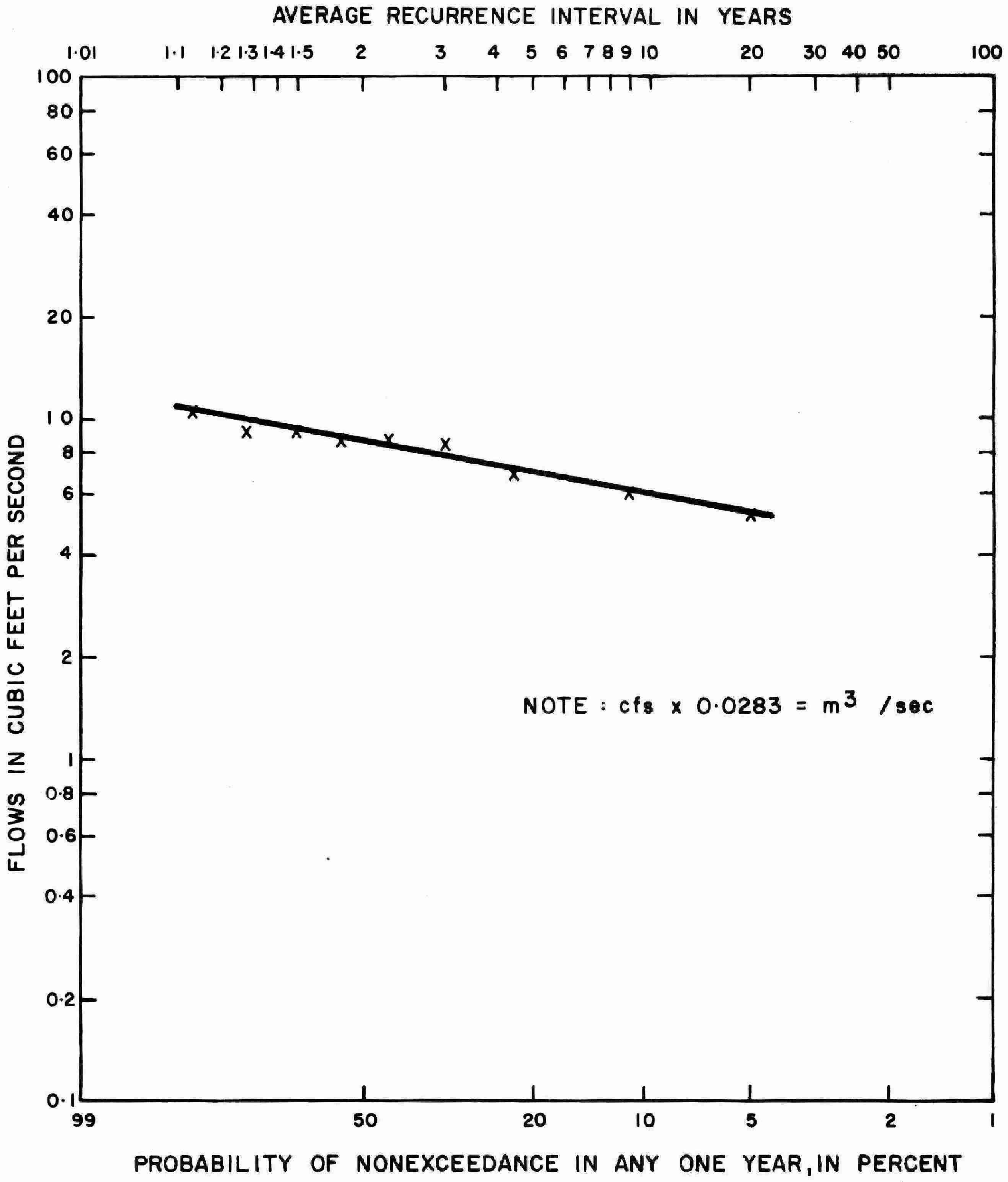


Figure 3 : Frequency Curve of Annual Minimum Flows Averaged over Seven Consecutive Days (7Q) for Station 02EC101 on Uxbridge Brook at Uxbridge; Period of Records: 1971 to 1978

It should be noted that two different methods of sampling were used. Grab samples were taken during the survey, while the sample results in the Municipal and Private Abatement Section's records were from eight-hour composite samples, which were more indicative of the effluent quality.

DISCUSSION OF SAMPLING RESULTS

The data collected during this survey is contained in Appendices II-XIII. The following is a discussion of selected water quality parameters.

Dissolved Oxygen

The average dissolved oxygen concentrations at all stream stations were greater than 5.0 mg/L (at 25°C), MOE's minimum objective for a cold-water fishery (Figure 4). Individual dissolved oxygen measurements including those taken at night were greater than 5.0 mg/L except at Station #10. Generally, the diurnal fluctuation in dissolved oxygen concentrations were minimal. At Station #10, day-time concentrations were greater than 5 mg/L; but night-time values were 4.7 mg/L on June 16 and 4.0 mg/L on August 4. These low values should not pose any problems since the existing fishery in that stream section consists of warm water species, for which MOE's objective is 4.0 mg/L (at 25°C). Noting that on three occasions (June 26, July 11 and 27), the waters at Station #10 were supersaturated, it was concluded that the dissolved oxygen fluctuation was caused by photosynthesis and respiration processes of aquatic plants. At this location the stream bed was almost completely covered with aquatic plants.

Five-Day Biochemical Oxygen Demand (BOD_5)

The average BOD_5's at all stations were favourably low with concentrations not exceeding 2 mg/L (Figure 4); very few individual concentrations exceeded 3 mg/L. The Ministry does not have a stream objective of BOD_5; but it is felt that by maintaining a stream BOD_5 of 4 mg/L or less the stream dissolved oxygen concentration should not normally be depleted below 5 mg/L. The BOD_5 load from the effluent of the Uxbridge STP did not have a notable impact on downstream quality. BOD_5 concentrations increased from 1.5 mg/L at Station #2 to 2.1 mg/L at Station #5 downstream of the Uxbridge STP outfall. The cause of the decrease in BOD_5 concentration at Station #7 was not investigated. It might have been partially attributable to an increase in flow of better quality water from the tributary on which Station #6 was located.

Nutrients

Phosphorus is generally recognized as the limiting nutrient for aquatic plant growth in streams. The MOE does not have a stream objective for phosphorus; but it does offer a guideline of 0.03 mg/L total phosphorus for the prevention of nuisance aquatic plant growth.

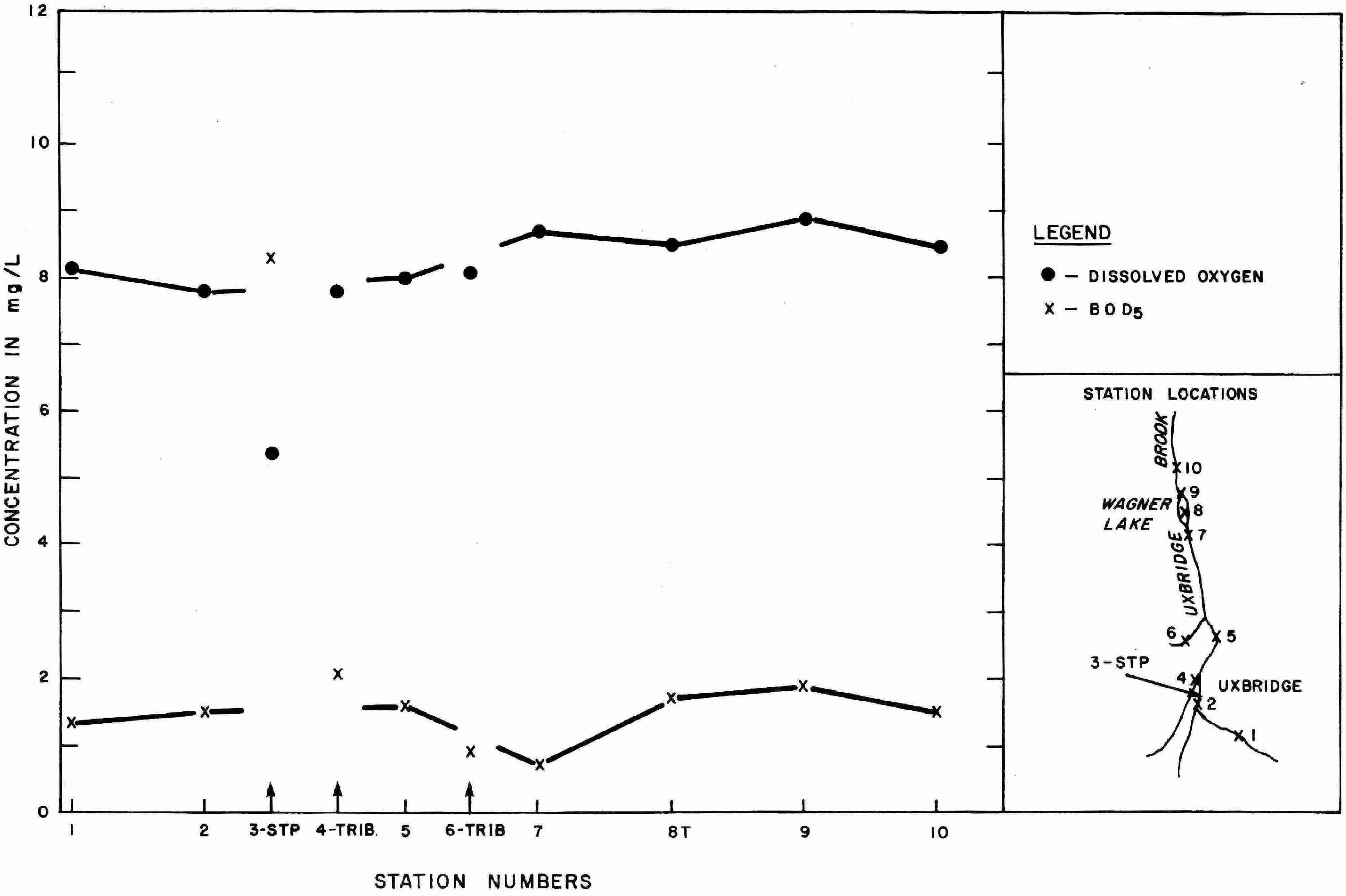


Figure 4 : Mean Dissolved Oxygen and B O D_5 Concentrations in Uxbridge Brook, and Tributaries, And in the Uxbridge S T P Outfall, 1978 Summer Survey

Station #1 was the only station where the mean phosphorus concentration met the MOE guideline (see Figure 5). The phosphorus concentration increased to 0.045 mg/L at Station #2 upstream of the Uxbridge STP outfall, probably because of the impact of urbanization in Uxbridge. The effluent from the Uxbridge STP did not cause a notable phosphorus increase downstream of the outfall since only a 0.004 mg/L increase was recorded at Station #5. There was no artificial input to the stream to account for the increase in phosphorus concentrations downstream of the STP outfall. The nature of the river and the lands immediately adjacent, i.e. swamp, could well be the cause.

There was a drop in phosphorus concentrations across Wagner Lake indicating that the lake was acting as a nutrient sink. From Figure 5, it could be seen that phosphorus concentration decreased from 0.104 mg/L at station #7 to 0.062 mg/L at Station #9.

Ammonia concentrations were generally low (Figure 6). At measured pH's and temperatures, only the concentration of 2.30 mg/L at Station #4 on one of the tributaries taken on July 11, 1978 was found to have exceeded MOE's objective of 0.02 mg/L for non-ionized ammonia. The non-ionized ammonia objective of 0.02 mg/L relates to fish toxicity. The ammonia concentrations in this tributary were higher relative to other stream stations. The causes of these high values are unknown.

MOE does not have a stream objective for total Kjeldahl nitrogen, nitrite nitrogen nor nitrate nitrogen. But in general, nitrite nitrogen in streams is expected to be almost absent since it is relatively unstable. High concentrations in the streams are indicative of sewage pollution. At Stations #4 and #5 the average nitrite concentrations of 1.0~~8~~9 mg/L and ~~1.09~~ 0.086 mg/L were high relative to those at other stations. The cause of the high nitrite values at station #4 is unknown; but the input from this tributary plus that from the Uxbridge STP likely resulted in the elevated values at station #5. The nitrate concentrations at all stations were low, with the average concentrations at each station being less than 1.0 mg/L.

Errata 11/3/82

Bacteria

The geometric mean bacteria densities at most stations exceeded MOE's objective for body contact recreational use (Figure 7). The effluent from the Uxbridge STP was partially the cause of the high bacteria densities in Uxbridge Brook. The Ministry considers surface waters to be unsuitable for body contact recreational use when the geometric mean densities of total and fecal coliform exceed 1000/100 ml and 100/100 ml respectively in a series of samples.

The stations meeting the MOE objective were #1, #8 (at all three depths in Wagner Lake), #9 and #10.

Wagner Lake

Based on the high average phosphorus concentrations of 0.042 mg/L at Station #8T, 0.058 mg/L at Station #8M, and 0.745 mg/L at Station #8B, Wagner Lake would be classified as enriched or "eutrophic". The major sources of phosphorus to the waters of Wagner Lake are the inflow of Uxbridge Brook and the lake's bottom

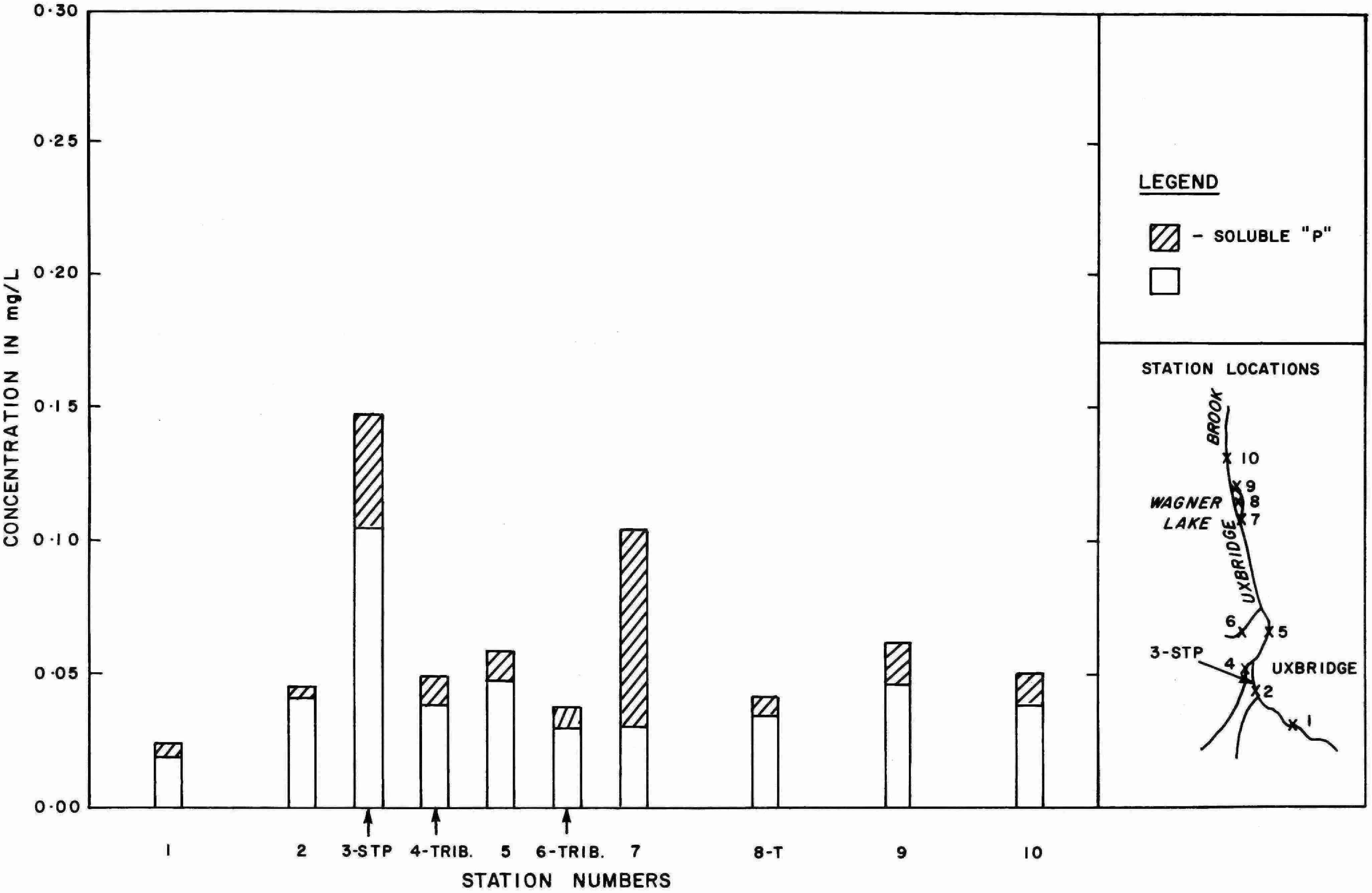


Figure 5 : Mean Total Phosphorus Concentrations in Uxbridge Brook and Tributaries, And in the Uxbridge S T P Outfall, Summer Survey 1978

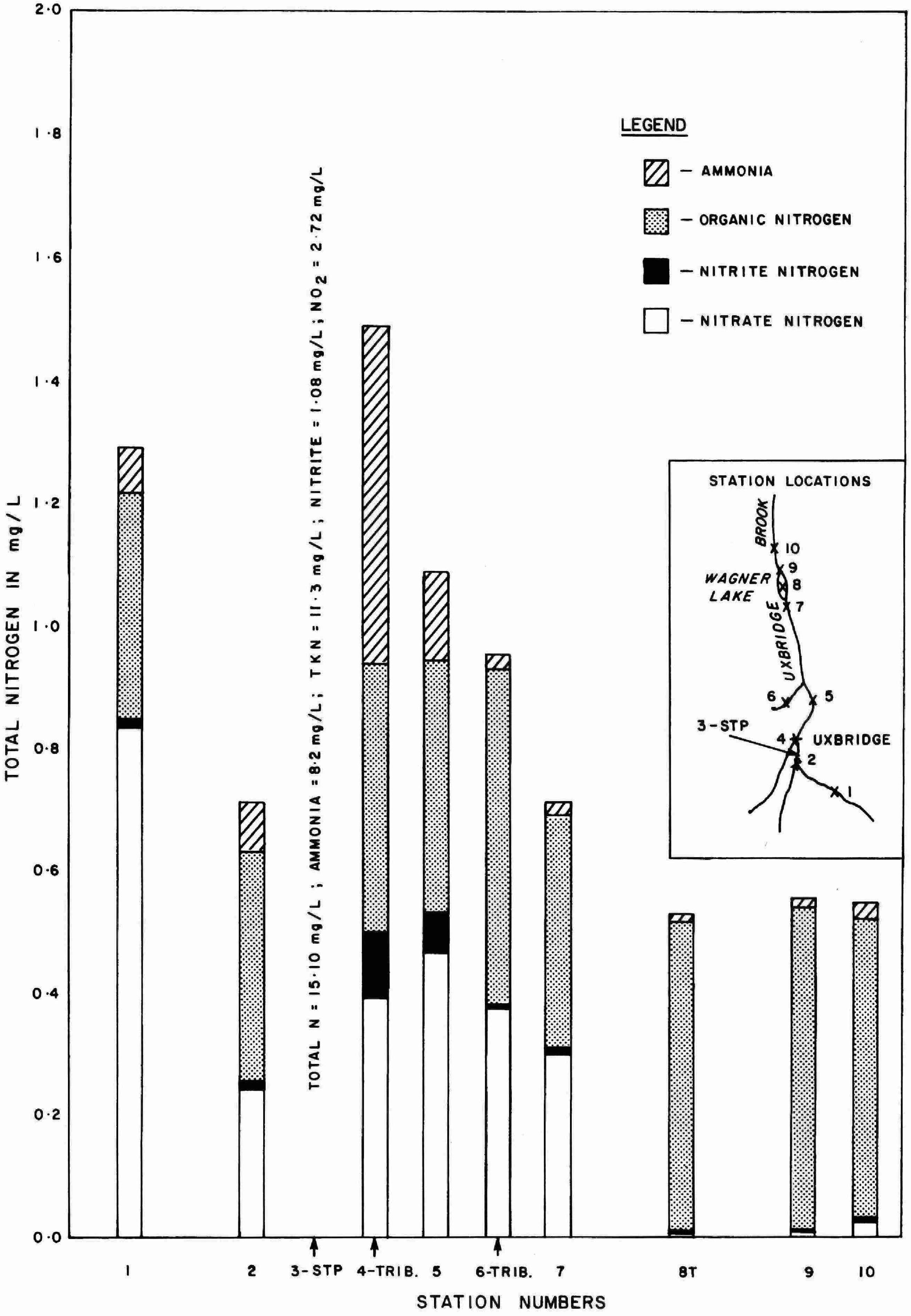


Figure 6 : Mean Total Nitrogen Concentrations in Uxbridge Brook and Tributaries, and in the Uxbridge S T P Outfall, Summer Survey 1978

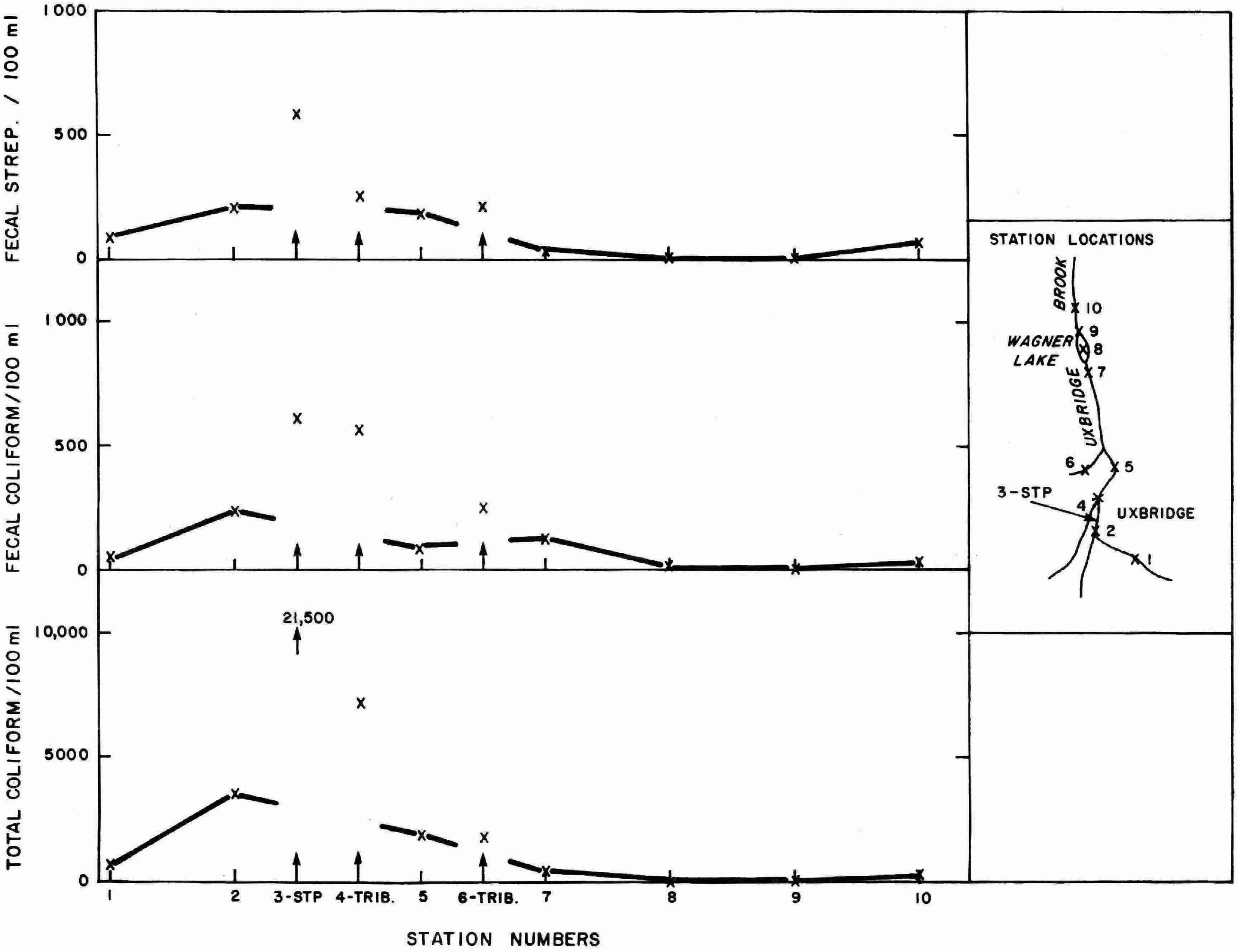


Figure 7 : Geometric Mean Bacteria Densities in Uxbridge Brook and Tributaries, And in the Uxbridge S T P Outfall, Summer Survey 1978

muds. Wagner Lake acts as a nutrient sink as indicated by the reduction in phosphorus and nitrogen concentrations across the lake from Station #7 to Station #9 (Figures #4 and #5).

The bottom waters of Wagner Lake (Station #8B) showed a high degree of enrichment. On the July 27 sampling visit, the bottom waters were almost anaerobic. It is evident that there was a high degree of chemical and microbiological activities in the bottom muds. This activity resulted in the sediment nutrients recycling into the overlying waters, resulting in the high concentrations at Station #8B.

Bottom Fauna

A wide variety of habitats for bottom fauna were sampled at each of 11 stream locations. Using small sieves and forceps, each of two staff members collected benthic organisms over a 30-minute period.

This qualitative analysis of bottom fauna in Uxbridge Brook did not reveal any definite impact of the Uxbridge STP effluent on the benthic community. Changes in the community structure were noted in the area of Wagner Lake. These were attributable to variation in habitat.

In general, the stream did support a reasonably good variety of benthic organisms, many of which were fish food organisms.

HISTORICAL WATER QUALITY

The Ministry has been collecting water quality data at Station #03-0077-014-02 on Uxbridge Brook (Station #5) since 1969. A summary of the historical water quality data is contained in Table 2.

All parameters appear to be stable except BOD_5 and phosphorus, which have been decreasing over the period of record. A probable reason for the reduced phosphorus after 1973 could have been the reduction in phosphate in laundry detergents at that time, since phosphorus removal facilities at this plant were not installed until about 1976. The reason for the decreasing BOD_5 at this station is not known.

Prior to the new sewage treatment facilities coming on line in December 1977, the old plant had a rated capacity of 2160 m^3/day (0.475 MIGD). In 1976 the average effluent volume discharged was 1415 m^3/day (0.311 MIGD). The effluent quality in 1976 was poor with BOD_5 = 31.8 mg/L, total phosphorus = 2.1 mg/L, TKN = 19.1 mg/L and suspended solids = 36.8 mg/L. With the new treatment facility on line, the total phosphorus concentration at this station was expected to improve. In 1977 the mean value for phosphorus at Station #03-0077-014-02 was 0.214 mg/L. This was probably caused by the STP effluent which had a mean concentration of 3.5 mg/L. In 1978 the phosphorus concentration in the effluent from the new plant improved to 0.49 mg/L and this improvement was reflected in the water quality data at Station #03-0077-014-02 where the mean stream concentration for phosphorus was 0.133 mg/L. The mean stream concentration would have been better still except for two high values, 0.395 mg/L on February 16 and 0.600 mg/L on August 22, 1978. The reasons for these elevated values cannot be accounted for because of the lack of data.

TABLE 2 - WATER QUALITY DATA FOR STATION 03-0077-014-02

ON UXBRIDGE BROOK

ANNUAL MEAN CONCENTRATIONS IN mg/L

PARAMETER	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
D.O.	9.2	6.6	7.8	9.4	9.2	9.5	10.0	10.7	9.7	12.0
Temp (°C)	14.0	9.5	10.4	9.2	12.7	6.7	11.5	11.4	10.9	9.4
BOD_5	5.9	5.2	5.6	5.8	5.4	3.4	3.2	2.1	4.3	1.3
Tot. P.	0.404	0.342	0.385	0.294	0.300	0.133	0.145	0.113	0.214	0.138
Sol. P.	0.211	0.243	0.226	0.156	0.161	0.060	0.049	0.026	0.115	0.017
Ammonia	0.44	0.52	0.68	0.62	0.55	0.042	0.064	0.271	0.721	0.409
TKN	1.64	1.51	1.58	1.31	1.28	0.97	1.14	0.93	1.38	0.34
Nitrite	0.045	0.054	0.106	0.075	0.167	0.076	0.120	0.014	0.047	0.079
Nitrate	0.409	0.458	0.462	0.692	0.574	0.598	0.618	0.459	0.404	0.544
Tot. Solids	331	252	318	299	267	270	305	326	293	282
Sus. Solids	36	14	33	13	21	19	32	32	17	12
Cond. $(\frac{umho}{cm})$	472	427	428	430	443	296	417	451	457	449

IMPACT OF STP ON UXBRIDGE BROOK AT DESIGN FLOW

The following is based on the assumption that there is complete mixing of the sewage effluent with the stream flow within a short distance from the STP outfall. This assumption is reasonably valid because the sewage flow is large relative to the available streamflow and because the stream near the outfall is only about 2.5 metres wide. Because of the foregoing, the impact will be determined by the mass balance equation using as parameters BOD_5, total phosphorus and ammonia.

The data to be used are those contained in this report and are as follows:

Design Stream Flow = 7Q20 at Station #02EC101 = 147 L/sec (see Figure 3)

Water Quality at Station #2:
(Appendix III)
BOD_5 = 1.5 mg/L
Tot. P = 0.045 mg/L
Ammonia = 0.079 mg/L

Sewage Effluent at Station #3:
(Appendix IV)
BOD_5 = 8.3 mg/L
Tot. P = 0.147 mg/L
Ammonia = 8.200 mg/L

The resultant downstream water quality at plant design capacity and under 7Q20 conditions would be:

BOD_5 = 3.0 mg/L
Tot. P = 0.067 mg/L
Ammonia = 1.873 mg/L

Because of the low resultant BOD_5 concentration in the stream, there should be no dissolved oxygen problem. The resultant phosphorus concentration downstream would be about 50 percent greater than the upstream value. At this concentration, excessive plant growth in the stream bed could be expected. At downstream pH's of 8 and temperature of 20° C, the resultant ammonia concentration of 1.873 mg/L would have the non-ionized portion in excess of 0.02 mg/L, MOE's objective for the protection of fish.

CONCLUSION

1. Ammonia and nitrite concentrations in the final effluent in the Uxbridge STP effluent were high considering the type of treatment provided; but these high concentrations did not have an adverse impact on stream quality downstream of the STP outfall.

2. Bacteria densities in the final effluent were higher than expected although the effluent was disinfected prior to discharge to the stream. Bacteria densities in Uxbridge Brook for the most part exceeded MOE criteria for body-contact recreational uses.

3. Phosphorus concentrations in Uxbridge Brook exceeded MOE's stream guideline. These concentrations were not caused by the effluent from the Uxbridge STP, but would appear to have been natural.

4. Toxic ammonia concentrations existed at Station #4 which is on a tributary to Uxbridge Brook. The cause of this was not determined.

5. The effluent discharged from the Uxbridge STP resulted in elevated downstream nitrite concentrations.

6. Wagner Lake was enriched. The cause of the enrichment was the nutrient load in the inflow from Uxbridge Brook.

7. Based on bacteria densities, Wagner Lake was fit for body contact recreational uses.

RECOMMENDATIONS

1. The cause of the high ammonia concentrations in the Uxbridge STP effluent should be investigated and necessary measures taken to ensure toxic stream conditions do not materialize at design flows.

2. Disinfectant practices at the Uxbridge STP should be investigated.

1982 01 04
AVCY/ns/REPT5-E

APPENDIX I - STREAM FLOWS FOR UXBRIDGE BROOK, 1978

UXBRIDGE BROOK AT UXBRIDGE - STATION #02EC101

DAILY DISCHARGE IN CUBIC FEET PER SECOND FOR 1978

DAY	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
1	9.5B	9.8	10.1	17.4	14.4	12.1	10.3	10.2	12.2	12.8	12.6	11.1
2	9.6B	9.9B	10.0	15.2	14.6	11.7	10.3	10.2	12.1	13.3	11.9	11.0
3	9.6B	9.7B	10.1	13.1	14.3	10.9	10.5	12.9	12.1	12.6	11.8	11.0
4	9.5B	9.6B	10.1	12.6	14.0	10.3	11.0	12.4	12.1	13.0	11.6	12.8
5	9.7B	9.8B	10.0	13.6	15.0	10.5	10.9	11.7	11.4	13.3	11.5	11.9
6	10.0B	9.6	9.8	14.5	16.3	10.5	10.8	11.3	10.6	12.7	11.4	11.3
7	10.8	9.5	9.8	22.8	15.7	11.4	12.8	11.1	10.4	12.5	11.3	10.9
8	15.0	9.3B	9.9	15.5	15.1	10.6	11.8	11.0	10.4	12.4	11.2	11.2
9	11.3	9.3B	9.9	13.7	17.2	10.2	11.9	11.3	10.2	11.9	11.2	11.0
10	10.9	9.3B	10.1	14.2	15.4	10.5	8.6	12.2	10.1	11.8	11.0	10.7
11	10.5	9.4	10.3	22.0	14.5	10.5	8.4	11.9	10.3	11.8	11.0	10.5
12	10.4	9.6	10.5	21.5	20.7	10.9	8.3	11.5	11.6	11.9	11.0	10.8
13	10.1	9.5	10.5	21.6	18.5	13.5	7.2	11.2	12.1	12.1	11.1	10.9
14	9.8	9.4	13.2	18.1	40.2	13.2	7.3	11.0	11.6	12.2	11.1	10.7
15	9.6	9.3	12.3	15.5	23.0	12.3	6.5	11.0	12.5	12.3	11.2	10.8
16	9.6	9.8	10.8	15.2	14.9	11.7	7.9	11.6	12.4	12.4	11.3	10.8
17	9.7	10.3	10.7	15.7	15.0	11.6	6.7	12.6	11.7	12.5	11.3	11.3
18	9.5	10.2	10.5	16.3	14.1	12.0	4.7	12.2	12.3	12.6	11.4	10.9
19	9.5	10.2	10.5	20.7	13.1	10.9	5.1	11.8	21.1	12.9	11.6	10.3
20	9.7	10.1	10.4	25.5	13.2	9.3	6.2	14.7	18.8	13.3	11.6	10.4
21	9.8	10.1	15.0	23.2	16.6	10.1	5.6	13.7	16.3	13.6	11.6	10.7
22	9.6	10.1	13.4	17.4	12.9	10.6	8.9	12.4	15.3	13.8	11.6	10.5
23	9.5	10.0	13.4	16.8	14.5	10.8	12.4	11.8	13.7	14.0	16.3	10.4
24	9.6	10.0	12.3	16.6	6.5	10.7	11.6	12.4	12.5	14.2	17.2	10.4
25	10.9	10.0	11.5	16.1	8.8	10.7	10.5	14.4	11.5	14.5	13.4	10.8
26	15.0	10.1	11.3	15.9	10.7	11.0	10.3	13.8	10.8	15.0	11.7	10.6
27	11.3	10.1	11.4	15.8	11.4	11.9	9.3	12.9	10.3	15.5	11.2	10.5
28	10.3	10.0	11.6	15.2	11.3	9.1	9.6	12.4	10.2	15.0	11.4	10.4
29	10.2	--	11.4	15.0	11.2	9.5	9.8	13.0	10.1	14.3	11.4	10.3
30	10.0	--	11.6	14.7	11.4	10.2	10.0	13.1	9.8	13.7	11.3	10.5
31	9.9	--	12.9	--	11.0	--	10.1	12.6	--	13.2	--	11.4
TOTAL	320.4	274.0	245.3	512.4	465.5	329.2	285.1	376.3	366.5	407.0	355.2	336.8
MEAN	10.3	9.8	11.1	17.1	15.0	11.0	9.2	12.1	12.2	13.1	11.8	10.9
AC-FT	636	543	685	1020	923	653	566	746	727	807	705	668
MAX	15.0	10.3	15.0	25.5	40.2	13.5	12.8	14.7	21.1	15.5	17.2	12.8
MIN	9.5	9.3	9.8	12.6	6.5	9.1	4.7	10.2	9.8	11.8	11.0	10.3

SUMMARY FOR THE YEAR 1978

Mean Discharge - 12.0 cfs
Total Discharge - 8680 ac-ft
Max. Daily Discharge - 40.2 cfs on May 14
Min. Daily Discharge - 4.7 cfs on July 18
Max. Instantaneous Discharge - 44.0 cfs at 1648 EST on May 12
Type of Gauge - Recording
Location - Lat. 44 06 45 N - Long. 79 07 20 W
Drainage Area - 9.4 square miles

B = Ice Conditions

APPENDIX 2 - WATER QUALITY DATA FOR 1978 SUMMER SURVEY OF UXBRIDGE BROOK

STATION #1 - UXBRIDGE BROOK

DATE	D.O.	TEMP.	BOD_5	BACTERIA/100 ML			PHOSPHORUS		NITROGEN				SOLIDS		COND.	pH
		(°C)		TOT. COLI.	FECAL COLI.	FECAL STREP.	TOT.	SOL.	F.A.	TKN	NO_2	NO_3	TOT.	SUSP.	$(\frac{umho}{cm})$	(unit)
18/05/78	8.8	13.5	0.8	C 340	4	16	0.030	0.001	0.026	0.41	0.008	0.815	240	12	350	8.2
01/06/78	8.0	17.3	2.8	1100	6	120	0.031	0.001	0.146	0.67	0.013	0.752	233	5.4	350	-
16/06/78*	9.6	13.5	1.2	C 340	3500	144	0.039	0.024	0.046	0.37	0.011	0.765	224	3.5	340	8.2
26/06/78	6.6	17.0	0.8	1200	16	76	0.020	0.005	0.038	0.36	0.010	0.800	254	3.9	385	8.1
11/07/78	7.4	18.5	1.4	270	18	126	0.013	0.001	0.052	0.47	0.010	0.785	226	2.0	345	8.0
27/07/78	8.0	18.5	1.4	4300	106	86	0.018	0.004	0.070	0.40	0.018	0.902	237	6.2	355	8.0
04/08/78*	8.2	15.5	1.0	1000	40	212	0.023	0.005	0.094	0.40	0.024	0.921	239	4.7	360	8.1
24/08/78	7.8	17.8	0.8	C 410	64	100	0.016	0.001	0.090	0.31	0.023	0.935	241	3.8	365	8.2
Geom. Mean				720	40	90										
Maximum	9.6	18.5	2.8	4300	3500	212	0.039	0.024	0.146	0.67	0.024	0.935	254	12	385	8.2
Mean	8.1	16.5	1.3	-	-	-	0.024	0.005	0.070	0.44	0.015	0.834	226	5.2	356	8.1
Minimum	6.6	13.5	0.8	270	4	16	0.018	0.001	0.026	0.31	0.010	0.752	207	2.0	340	8.0

* Night - Samples taken between 1:00 a.m. and 6:00 a.m.

NB All concentrations are in mg/L unless otherwise indicated.

AVCY/ns/REPT 8-I-2

APPENDIX 3 - WATER QUALITY DATA FOR 1978 SUMMER SURVEY OF UXBRIDGE BROOK

STATION #2 - UXBRIDGE BROOK (#02EC101)

DATE	D.O.	TEMP.	BOD$_5$	BACTERIA/100 ML			PHOSPHORUS		NITROGEN				SOLIDS		COND.	pH	FLOW
		(°C)		TOT. COLI.	FECAL COLI.	FECAL STREP.	TOT.	SOL.	F.A.	TKN	NO$_2$	NO$_3$	TOT.	SUSP.	($\frac{\text{umho}}{\text{cm}}$)	(unit)	(cfs)
18/05/78	10.3	13.0	0.4	1100	40	64	0.036	0.003	0.032	0.35	0.007	0.370	267	20	380	8.2	-
01/06/78	7.8	21.0	1.2	2500	84	92	0.036	0.007	0.056	0.32	0.008	0.152	245	7.9	365	-	8.6
16/06/78*	8.9	15.0	1.0	2400	390	240	0.032	0.002	0.052	0.45	0.010	0.190	249	7.6	370	8.3	8.8
26/06/78	7.4	19.0	0.8	2300	200	424	0.066	0.005	0.036	0.50	0.007	0.140	273	42	355	8.3	7.6
11/07/78	6.8	20.0	1.8	45000	300	184	0.042	0.004	0.234	0.66	0.028	0.370	285	4.7	435	8.2	-
27/07/78	7.9	20.3	2.4	1300	124	108	0.027	0.003	0.064	0.37	0.014	0.286	185	5.5	275	8.1	6.7
04/08/78*	7.3	17.2	1.5	2200	1700	584	0.037	0.004	0.064	0.42	0.015	0.245	255	11	375	8.2	10.9
24/08/78	6.1	19.0	2.6	G15000	G600	G600	0.084	0.002	0.090	0.63	0.011	0.210	263	22	370	8.2	-
Geom. Mean				3620	240	213											
Maximum	10.3	21.0	2.6	45000	1700	600	0.084	0.007	0.234	0.66	0.028	0.370	285	42	435	8.1	10.9
Mean	7.8	18.1	1.5	-	-	-	0.045	0.004	0.079	0.46	0.013	0.241	253	15.1	365	8.2	8.5
Minimum	6.1	13.0	0.4	1100	40	64	0.027	0.002	0.032	0.32	0.007	0.140	185	4.7	275	8.3	6.7

* Night - Samples taken between 1:00 a.m. and 6:00 a.m.

NB All concentrations are in mg/L unless otherwise indicated.

AVCY/ns/REPT 8-I-3

APPENDIX 4 - WATER QUALITY DATA FOR 1978 SUMMER SURVEY OF UXBRIDGE BROOK

STATION #3 - UXBRIDGE STP OUTFALL

DATE	D.O.	TEMP.	BOD_5	BACTERIA/100 ML			PHOSPHORUS		NITROGEN				SOLIDS		COND.	pH	SEWAGE FLOW
		(°C)		TOT. COLI.	FECAL COLI.	FECAL STREP.	TOT.	SOL.	F.A.	TKN	NO_2	NO_3	TOT.	SUSP.	$(\frac{umho}{cm})$	(units)	(MGD)
18/05/78	5.7	13.4	3.2	C 4800	4	396	E	0.036	E	E	0.074	E	684	9.0	1060	7.6	0.344
01/06/78	6.5	20.0	6.5	110000	3200	900	0.250	0.064	4.15	E	3.9	0.850	629	3.90	1060	-	0.387
16/06/78*	5.4	14.2	2.8	C 1100	104	48	0.090	0.062	8.35	9.3	1.08	0.100	593	1.2	1020	7.9	0.410
26/06/78	6.1	17.5	9.0	18000	1200	220	0.126	0.058	11.2	12.6	0.830	0.400	658	2.1	1130	7.5	0.302
11/07/78	5.0	20.0	28.0	250000	6100	G1500	0.266	0.034	E	E	E	E	655	3.1	1110	8.2	0.348
27/07/78	4.9	20.3	5.5	98000	4200	A 500	0.073	0.017	E	E	E	E	602	2.4	1060	7.5	0.247
04/08/78*	5.6	19.5	8.0	49000	504	3620	0.152	0.046	9.20	12.3	0.460	11.3	611	3.9	1080	7.6	0.287
24/08/78	3.8	20.6	3.0	C 3700	970	G1500	0.072	0.029	-	11.0	0.120	0.930	626	1.7	1070	7.6	0.296
Geom. Mean				21500	613	593											
Maximum	6.5	20.3	28	250000	6100	3620	0.266	0.064	11.2	12.6	3.90	11.3	685	9.0	1130	8.2	0.410
Mean	5.4	18.2	8.3	-	-	-	0.147	0.043	8.2	11.3	1.08	2.72	632	3.4	1074	7.7	0.328
Minimum	4.9	13.4	2.8	1100	4	48	0.072	0.017	4.2	9.3	0.074	0.10	593	1.2	1020	7.5	0.247

* Night - Samples taken between 1:00 a.m. and 6:00 a.m.

NB All concentrations are in mg/L unless otherwise indicated.

AVCY/ns/REPT 8-I-4

APPENDIX 5 - WATER QUALITY DATA FOR 1978 SUMMER SURVEY OF UXBRIDGE BROOK

STATION #4 - TRIBUTARY TO UXBRIDGE BROOK

DATE	D.O.	TEMP.	BOD$_5$	BACTERIA/100 ML			PHOSPHORUS		NITROGEN				SOLIDS		COND.	pH
		(°C)		TOT. COLI.	FECAL COLI.	FECAL STREP.	TOT.	SOL.	F.A.	TKN	NO$_2$	NO$_3$	TOT.	SUSP.	($\frac{\text{umho}}{\text{cm}}$)	(unit)
18/05/78	9.4	12.1	0.4	C7300	196	248	0.052	0.008	0.090	0.53	0.015	0.660	306	14	450	8.2
01/06/78	7.0	19.5	2.2	6500	130	94	0.034	0.013	0.400	0.70	0.042	0.293	292	16	425	-
16/16/78*	8.5	15.0	1.5	A 900	324	212	0.057	0.022	0.266	0.62	0.054	0.245	273	13	400	8.2
26/06/78	7.1	19.0	1.0	5500	160	244	0.030	0.006	0.210	0.67	0.043	0.240	255	4.7	385	8.3
11/07/78	7.8	19.2	4.5	21000	560	196	0.061	0.016	2.30	2.95	0.450	0.600	360	3.2	590	8.2
27/07/78	8.3	21.3	2.2	9400	370	148	0.029	0.007	0.490	0.87	0.135	0.430	276	5.5	415	8.1
04/08/78*	7.5	17.5	2.2	C3600	444	436	0.052	0.007	0.268	0.79	0.064	0.326	276	16	400	8.2
24/08/78	7.1	19.2	2.8	40000	830	1500	0.073	0.003	0.364	0.80	0.065	0.350	294	31	405	8.1
Geom. Mean				7130	317	263										
Maximum	9.4	21.3	4.5	40000	830	1500	0.073	0.022	2.30	2.95	0.450	0.660	360	31	590	8.3
Mean	7.8	17.9	2.1	-	-	-	0.049	0.010	0.549	0.99	0.109	0.393	292	13	434	8.2
Minimum	7.0	12.1	0.4	900	130	94	0.029	0.006	0.090	0.53	0.015	0.240	255	3.2	415	8.1

* Night - Samples taken between 1:00 a.m. and 6:00 a.m.

NB All concentrations are in mg/L unless otherwise indicated.

APPENDIX 6 - WATER QUALITY DATA FOR 1978 SUMMER SURVEY OF UXBRIDGE BROOK

STATION #5 - UXBRIDGE BROOK

DATE	D.O.	TEMP.	BOD_5	BACTERIA/100 ML			PHOSPHORUS		NITROGEN				SOLIDS		COND.	pH
		(°C)		TOT. COLI.	FECAL COLI.	FECAL STREP.	TOT.	SOL.	F.A.	TKN	NO_2	NO_3	TOT.	SUSP.	$(\frac{umho}{cm})$	(unit)
18/05/78	7.4	12.0	0.5	C5800	256	184	0.057	0.006	0.066	0.53	0.015	0.585	317	18	450	8.1
01/06/78	8.8	18.5	1.8	1400	60	116	0.052	0.016	0.196	0.55	0.083	0.362	286	16	415	-
16/06/78*	7.9	14.0	2.0	3100	408	196	0.067	0.009	0.220	0.66	0.064	0.370	292	26	410	8.1
26/06/78	8.0	18.5	0.8	C 400	4	200	0.034	0.011	0.196	0.47	0.084	0.430	264	4.4	400	8.2
11/07/78	8.3	20.0	2.5	2800	136	192	0.057	0.006	0.130	0.59	0.064	0.355	264	3.8	400	8.3
27/07/78	8.9	20.6	1.4	2500	396	184	0.036	0.014	0.158	0.46	0.100	0.550	266	3.0	405	8.2
04/08/78*	7.2	16.0	2.0	C5000	384	552	0.058	0.011	0.180	0.55	0.077	0.497	280	20	400	8.1
24/08/78	7.4	19.0	2.0	A 600	12	100	0.107	0.016	0.148	0.61	0.450	0.545	310	53	395	8.1
Geom. Mean				1950	94	189										
Maximum	8.9	20.6	2.5	5800	408	552	0.107	0.016	0.220	0.66	0.100	0.585	317	53	450	8.3
Mean	8.0	17.3	1.6	-	-	-	0.059	0.011	0.146	0.55	0.066	0.462	285	18	408	8.1
Minimum	7.2	12.2	0.5	400	4	100	0.034	0.006	0.066	0.46	0.015	0.355	264	3.0	395	8.1

* Night - Samples taken between 1:00 a.m. and 6:00 a.m.

NB All concentrations are in mg/L unless otherwise indicated.

APPENDIX 7 - WATER QUALITY DATA FOR 1978 SUMMER SURVEY OF UXBRIDGE BROOK

STATION #6 - TRIBUTARY TO UXBRIDGE BROOK

DATE	D.O.	TEMP.	BOD_5	BACTERIA/100 ML			PHOSPHORUS		NITROGEN				SOLIDS		COND.	pH
		(°C)		TOT. COLI.	FECAL COLI.	FECAL STREP.	TOT.	SOL.	F.A.	TKN	NO_2	NO_3	TOT.	SUSP.	$(\frac{umho}{cm})$	(unit)
18/05/78	6.2	14.0	0.2	190	4	8	0.020	0.002	0.002	0.45	0.005	0.255	330	4.5	520	8.1
16/06/78*	8.3	13.5	1.2	C 810	220	332	0.056	0.009	0.020	0.60	0.010	0.535	370	17	570	8.1
26/06/78	8.0	18.5	0.5	1600	278	240	0.024	0.008	0.018	0.39	0.008	0.455	374	2.0	580	8.1
11/07/78	11.0	19.8	0.8	C1600	640	G300	0.063	0.006	0.010	0.79	0.006	0.455	351	4.9	540	8.3
27/07/78	9.4	20.9	1.2	3700	1050	850	0.032	0.007	0.046	0.47	0.009	0.336	343	4.1	550	8.2
04/08/78*	7.0	15.5	1.4	C3200	720	664	0.031	0.013	0.026	0.47	0.008	0.373	400	8.9	620	7.9
24/08/78	6.7	18.8	1.0	14000	A700	240	0.036	0.005	0.022	0.48	0.005	0.235	424	6.2	640	8.0
Geom. Mean				1860	261	221										
Maximum	11.0	20.9	1.4	14000	1050	850	0.063	0.013	0.046	0.79	0.010	0.535	424	17	640	8.2
Mean	8.1	17.3	0.9	-	-	-	0.037	0.007	0.021	0.52	0.007	0.376	370	6.8	574	8.1
Minimum	6.2	13.5	0.2	190	4	8	0.020	0.002	0.002	0.39	0.005	0.255	300	2.0	520	7.9

* Night - Samples taken between 1:00 a.m. and 6:00 a.m.

NB All concentrations are in mg/L unless otherwise indicated.

APPENDIX 8 - WATER QUALITY DATA FOR 1978 SUMMER SURVEY OF UXBRIDGE BROOK

STATION #7 - UXBRIDGE BROOK

DATE	D.O.	TEMP.	BOD_5	BACTERIA/100 ML			PHOSPHORUS		NITROGEN				SOLIDS		COND.	pH
		(°C)		TOT. COLI.	FECAL COLI.	FECAL STREP.	TOT.	SOL.	F.A.	TKN	NO_2	NO_3	TOT.	SUSP.	($\frac{umho}{cm}$)	(unit)
26/06/78	8.4	21.0	0.4	C 360	204	28	0.072	0.044	0.016	0.41	0.018	0.355	273	3.2	415	8.1
11/07/78	9.2	19.6	1.0	C 340	84	44	0.129	0.089	0.030	0.38	0.009	0.270	272	2.3	415	8.3
27/07/78	8.6	-	0.8	A 800	116	68	0.111	0.089	0.026	0.40	0.010	0.265	272	1.7	415	8.1
Geom. Mean				460	130	44										
Maximum	9.2	21.0	1.0	800	204	68	0.129	0.089	0.030	0.41	0.018	0.355	273	3.2	415	8.3
Mean	8.7	20.3	0.7	-	-	-	0.104	0.074	0.024	0.40	0.012	0.300	272	2.4	415	8.2
Minimum	8.4	19.6	0.4	340	84	28	0.072	0.044	0.016	0.38	0.009	0.265	272	1.7	415	8.1

NB All concentrations are in mg/L unless otherwise indicated.

AVCY/REPT 8-I-8

APPENDIX 9 - WATER QUALITY DATA FOR 1978 SUMMER SURVEY OF UXBRIDGE BROOK

STATION #8T - WAGNER LAKE, TOP WATERS

DATE	D.O.	TEMP.	BOD_5	BACTERIA/100 ML			PHOSPHORUS		NITROGEN				SOLIDS		COND.	pH
		(°C)		TOT. COLI.	FECAL COLI.	FECAL STREP.	TOT.	SOL.	F.A.	TKN	NO_2	NO_3	TOT.	SUSP.	(umho/cm)	(unit)
01/06/78	7.4	23.5	1.2	10	4	4	0.018	0.003	0.022	0.41	0.003	0.005	260	3.2	395	-
26/06/78	8.4	22.5	-	C 90	4	100	0.038	0.001	0.006	0.52	0.002	0.005	253	3.1	385	8.6
11/07/78	8.0	22.6	1.8	4	4	100	0.061	0.019	0.016	0.53	0.001	0.005	253	3.2	385	8.4
27/07/78	10.0	24.5	2.2	2	2	2	0.052	0.005	0.012	0.61	0.001	0.005	239	5.1	360	8.5
Geom. Mean				10	4	17										
Maximum	10.1	24.5	2.2	90	4	100	0.061	0.019	0.022	0.61	0.003	0.005	260	5.1	395	8.6
Mean	8.5	23.3	1.7	-	-	-	0.042	0.007	0.014	0.52	0.002	0.005	251	3.7	381	8.5
Minimum	7.4	22.5	1.2	4	2	2	0.018	0.001	0.006	0.41	0.001	0.005	239	3.1	360	8.4

NB All concentrations are in mg/L unless otherwise indicated.

APPENDIX 10 - WATER QUALITY DATA FOR 1978 SUMMER SURVEY OF UXBRIDGE BROOK

STATION #8M - WAGNER LAKE, MID-DEPTH WATERS

DATE	D.O.	TEMP.	BOD_5	BACTERIA/100 ML			PHOSPHORUS		NITROGEN				SOLIDS		COND.	pH
		(°C)		TOT. COLI.	FECAL COLI.	FECAL STREP.	TOT.	SOL.	F.A.	TKN	NO_2	NO_3	TOT.	SUSP.	$(\frac{umho}{cm})$	(unit)
01/06/78	6.7	17.3	2.4	270	10	10	0.054	0.005	0.072	0.61	0.003	0.005	260	6.5	390	-
26/06/78	8.4	21.4	1.5	A70	4	10	0.054	0.004	0.012	0.62	0.003	0.005	257	3.8	390	8.5
11/07/78	6.0	21.8	1.8	4	4	10	0.066	0.023	0.022	0.54	0.001	0.005	252	4.6	380	8.4
27/07/78	8.8	24.0	2.0	8	2	2	0.058	0.013	0.014	0.59	0.001	0.005	243	5.8	365	8.3
Geom. Mean				28	4	7										
Maximum	8.8	24.0	2.4	270	10	10	0.066	0.023	0.072	0.62	0.003	0.005	260	6.5	390	8.5
Mean	7.5	21.1	1.9	-	-	-	0.058	0.011	0.030	0.59	0.002	0.005	253	5.2	381	8.4
Minimum	6.0	17.3	1.5	4	2	2	0.054	0.004	0.012	0.54	0.001	0.005	243	3.8	365	8.3

NB All concentrations are in mg/L unless otherwise indicated.

AVCY/REPT 8-I-10

APPENDIX 11 - WATER QUALITY DATA FOR 1978 SUMMER SURVEY OF UXBRIDGE BROOK

STATION #8B - WAGNER LAKE, BOTTOM WATERS

DATE	D.O.	TEMP.	BOD_5	BACTERIA/100 ML			PHOSPHORUS		NITROGEN				SOLIDS		COND.	pH
		(°C)		TOT. COLI.	FECAL COLI.	FECAL STREP.	TOT.	SOL.	F.A.	TKN	NO_2	NO_3	TOT.	SUSP.	$(\frac{umho}{cm})$	(unit)
01/06/78	2.6	13.8	4.5	10	4	G1500	0.635	0.200	0.660	1.80	0.006	0.005	309	52	395	-
26/06/78	5.5	17.5	3.0	C100	4	10	0.420	0.280	0.700	1.92	0.002	0.005	276	10	410	7.4
11/07/78	2.2	17.0	7.0	100	10	10	E	E	E	E	0.003	0.005	306	26	430	-
22/07/78	0.7	20.5	11.0	100	10	10	1.18	0.700	2.350	4.60	0.002	0.005	309	53	430	7.6
Geom. Mean				56	6	35										
Maximum	5.5	20.5	11.0	100	10	1500	1.18	0.700	2.35	4.60	0.006	0.005	309	53	430	7.6
Mean	2.8	17.2	6.4	-	-	-	0.745	0.393	1.24	2.77	0.003	0.005	300	35	416	7.5
Minimum	0.7	13.8	3.0	10	4	10	0.135	0.200	0.660	1.80	0.002	0.005	276	10	395	7.4

NB All concentrations are in mg/L unless otherwise indicated.

AVCY/REPT 8-I-11

APPENDIX 12 - WATER QUALITY DATA FOR 1978 SUMMER SURVEY OF UXBRIDGE BROOK

STATION #9 - UXBRIDGE BROOK

DATE	D.O.	TEMP.	BOD_5	BACTERIA/100 ML			PHOSPHORUS		NITROGEN				SOLIDS		COND.	pH
		(°C)		TOT. COLI.	FECAL COLI.	FECAL STREP.	TOT.	SOL.	F.A.	TKN	NO_2	NO_3	TOT.	SUSP.	$(\frac{umho}{cm})$	(unit)
11/07/78	7.6	23.3	1.8	250	10	10	0.065	0.025	0.024	0.490	0.003	0.005	251	3.5	385	8.3
27/07/78	10.1	20.0	2.0	A 20	2	6	0.058	0.007	0.008	0.610	0.001	0.005	237	5.9	355	8.5
Geom. Mean				71	4	8										
Maximum	10.1	23.3	2.0	250	10	10	0.065	0.025	0.024	0.061	0.003	0.005	251	5.9	385	8.5
Mean	8.9	21.7	1.9	-	-	-	0.062	0.016	0.016	0.055	0.002	0.005	244	4.7	370	8.4
Minimum	7.6	20.0	1.8	20	2	6	0.058	0.007	0.008	0.049	0.001	0.005	237	3.5	355	8.3

NB All concentrations are in mg/L unless otherwise indicated.

AVCY/REPT 8-I-12

APPENDIX 13 - WATER QUALITY DATA FOR 1978 SUMMER SURVEY OF UXBRIDGE BROOK

STATION #10 - UXBRIDGE BROOK

DATE	D.O.	TEMP.	BOD_5	BACTERIA/100 ML			PHOSPHORUS		NITROGEN				SOLIDS		COND.	pH
		(°C)		TOT. COLI.	FECAL COLI.	FECAL STREP.	TOT.	SOL.	F.A.	TKN	NO_2	NO_3	TOT.	SUSP.	($\frac{umho}{cm}$)	(unit)
18/05/78	9.9	16.4	1.4	160	4	4	0.051	0.001	0.002	0.62	0.002	0.010	262	15	380	8.4
01/06/78	7.2	23.5	1.8	A 30	4	32	0.030	0.004	0.014	0.45	0.003	0.005	293	46	380	-
16/06/78*	4.7	16.0	1.5	C 330	56	80	0.056	0.006	0.002	0.46	0.003	0.005	276	13	405	8.1
26/06/78	12.6	22.0	0.4	110	4	12	0.044	0.015	0.004	0.46	0.002	0.005	249	2.4	380	8.7
11/07/78	12.2	22.2	1.8	A 200	A 20	270	0.055	0.018	0.004	0.50	0.006	0.010	250	3.0	380	8.6
27/07/78	11.4	24.8	1.0	A 90	36	76	0.048	0.019	0.016	0.49	0.005	0.035	235	3.9	355	8.6
04/08/78*	4.0	20.0	1.8	C 370	100	280	0.068	0.030	0.080	0.59	0.009	0.049	255	5.1	385	7.9
24/08/78	5.9	23.0	2.0	4400	G300	500	0.057	0.006	0.078	0.56	0.010	0.065	243	5.8	365	8.0
Geom. Mean				218	23	66										
Maximum	12.6	24.8	2.0	4400	300	500	0.068	0.030	0.080	0.62	0.010	0.065	293	46	405	8.7
Mean	8.5	21.0	1.5	-	-	-	0.051	0.012	0.025	0.52	0.005	0.023	258	11.8	379	8.3
Minimum	4.0	16.0	0.4	30	4	4	0.030	0.001	0.002	0.45	0.001	0.005	235	2.4	355	7.9

* Night - Samples taken between 1:00 a.m. and 6:00 a.m.

NB All concentrations are in mg/L unless otherwise indicated.

~~APR 27 1982~~

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